

April 26, 1930

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# speaking of *Records*..

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# Wasp & Hornet Engines



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### COMING

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Conquest R-266, 65 HP airplane engine. Lower left: 802 by LAMBERT AIRCRAFT ENGINE CO. LTD., Mohon, N. Y. Nickel Cast Iron cylinder by Davenport Locomotive & Mfg. Corp., Davenport, Iowa.

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# AVIATION

THE OLDEST AMERICAN AERONAUTICAL MAGAZINE

A McGRAW-HILL PUBLICATION ESTABLISHED 1910

EDWARD P. WARNER, Editor

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### Comte de la Vaulx

**A**LTHOUGH the heavy blow struck at aviation by the crash at Jersey City last Friday will be felt with profound force in France, the great cause of France who was among the victims will be mourned by the whole world. A gesture of brotherly devotion to the progress of aviation as a safe, trustworthy, exacting, and profitable personal means, of fact and claim, and that quality which can only be designated by using the Comte's own tongue and telling it then have given him a unique place in aeronautical affairs.

France has been peculiarly unfortunate in the loss by accident of several of her aeronautical elder statesmen, leaders of thought and policy. Almost twenty years ago the Minister of War of the time was killed by a plane while a spectator at a race. It is little more than a year since the honored Marquis Bokanowski, Minister of Commerce and aeronautical enthusiast of the first water was the victim of a crash of a military airplane of which he was a passenger. And now the Comte de la Vaulx, and France will mourn, and those who know the background of present-day aviation will mourn with her.

American aeronautical visitors to Paris have often noted the functioning of the Aero Club of France, at once a social gathering place for those of common aeronautical interest and a focus for the harmonious exercise of full control over all that pertains to flying as a sport. The development of French sporting aviation and of the Club's share in it has been singularly untroubled by political or personal controversy. The Aero Club's leadership has been unchallenged.

Aeronautical people the world over have for twenty years had to be grateful for the existence and the working of the Fédération Aéronautique Internationale, and especially if they have been familiar with the records of

international control in various other sports, such as automobile or motor boat racing. The career of international federation in sporting activities has immensely been short, and it has usually been turbulent. In no other branch of sport are world records so clearly and unopposedly recognized and so well protected against challenge as in aviation. That it is so, and that the F.A.I. will never essentially open the lines laid down when the airplane was yet a seven days' wonder and a two-hour flight was a miracle, stands to the great honor of those who have shaped the Federation's course.

The Comte de la Vaulx was the founder of the Aero Club of France. He was the president of the F.A.I., and certainly no other influence was more strongly and fervently manifested in its evolution. The organization owed its birth to him.

//

### Accident Figures

**"T**HREE ARE," said Mark Twain, "three sorts of pretension, plain lies, damn lies, and statistics." A certain number of those who collect and disseminate aeronautical information or propaganda have been doing their best to put the stamp of accuracy upon their somewhat spiced compilation.

Not many weeks ago, a writer in Liberty magazine made plausible protest against the misleading quality of much of the statistical material that he encountered when he sought data on aircraft accidents. He then proceeded to give credence to some data of his own quite as misleading as any that he could have secured from any other source, but that is by the way. For his fundamental complaint it has been easy to find supporting evidence.

It has been argued that accident is safer than riding on the subway, because the number of people killed in a year by railroad trains, including streetcars and trolleys on the right of way, is greater than the number killed in the air. It has been argued that flying is safer than being in a certain mid-western state, because the hard logs of miles claim a larger aggregate number of victims annually than do crashes. It has been argued that the airplane is safer than the street car because the number of airplane miles per aviation death is larger than the number of trolley miles per death committed in some way by railroading, entirely disregarding the difference in the average number of persons exposed to injury in a single accident.

We believe in the growing safety of aviation. We believe that the airplane is even now much safer under normal conditions than most people realize and that under selected conditions it is very safe indeed, but we do not intend to promote that belief by circulating "statistics" prepared upon bases so grotesque that they would not deserve a merely brief ten-second old. To fear that sort of statistical trash upon the world is of no value in persuading the general public of the value of aviation. It has the effect rather of suggesting to intelligent men that if it is necessary to go in the trouble of gathering such preposterously fallacious material as that it must be because a true and fair presentation would be an unpleasant contemplation.

Misleadingly misstate accident statistics not only disgust the precise notion of the non-aviationist countries, whose confidence we ought to be most interested in getting, but they have an equally unfortunate effect within our own country. No value of transport is ever safe enough as long as there continue to be any accidents whatever, and so reluctance in safety effort is ever justified.

We cannot maintain a continuous, vigorous and intelligent effort for improvement in our accident record if we continue to feed ourselves as well as our customers on statistical opiates.

In the past six months the aviation industry, wholeheartedly as never before, has looked the accident situation in the face and talked about it squarely. The general willingness to do so has been the most cheering symptom of a period that has not been without its discouraging features.

Now that we have recognized that fact, the next step is to find out exactly what we are talking about, and that demands two things. It demands the adoption of fair and adequate statistical yardsticks for the determination of the actual safety of aviation at the present time. Only by the production and use of such comparative measures shall we be able to tell whether or not we are progressing, and how rapidly. It demands also a detailed analysis of accidents as it is done. At the present time it is fair to say that the method of accident analysis produced by the sub-committee on accidents of the National

Advisors Committee and adopted by the Department of Commerce is well as by the Army and Navy, is superior to anything of the sort that has ever been used anywhere else in the world. The methods should be more clearly understood and the results of the general analysis should be patiently and accurately studied, by the aircraft industry. The Department of Commerce is on the right track in this matter, but there is more that could and should be done. There should, for example, be an official investigation of the number of passenger-miles flown annually to furnish an accurate basis for passenger-based statistics such as we have approximated as best we could in the recent statistical work of Aviation. There should be a little-drawn of accident records into two groups, those which occurred while the airplane was being used in a reasonable fashion as a vehicle of transportation, and those which resulted from operations entirely alien to the machine's transport function and estimated rather with deliberate thrill-protection. Of the innumerable large number of accidents that occur in non-aviation flying we ought to be told definitely just how many we can charge to aviation, even to aviation practiced with poor judgment and with faulty technique, and how many ought rather to be charged against crews performing.

There are other desirable cuts that we might list at length, but they need all while as one respect. Through all statistical accident work one fundamental correction must be made. The facts and the figures must be prepared, stored and used not primarily for the purpose of proving something but to the end that we may learn the truth.

## //

### Rising and Lieutenant Williams

LEUT. ALFORD J. WILLIAMS, with thirteen years of naval service, most of which has been of a very specialized character and which has never involved any service at sea, and for a number of years as service with any naval aeronautical organization, has resigned from the service. His resignation immediately becomes the subject of unbroken commissions and of post-mortem and far-reaching investigations in Congressional halls. It is much to be regretted that naval aviation should lose so magnificent a pilot, but those who have been watching closely upon the development of Lieutenant Williams' work and upon the progress of naval aviation over the last few years have had plenty of time to grow accustomed to the prospect. It became more and more plain inevitable to Lieutenant Williams' fate as a project in which the Navy was in no position to take any active part, and from which it could draw only indirect and dubious benefit, considered undignified and as the complexity of the problem of developing a racing plane continued to unfold.

Congress is investigating, but unfortunately as an investigation seems to be confined to the history of the Mercury racing plane in its latest manifestation, in the events immediately prior to Lieutenant Williams' tender of his resignation, and to some general considerations concerning the relative performance of American and European flying airplanes. The special committee might profitably inquire into the history of American participation in air racing and some brilliant recommendations to the Congressional machine thereto.

Governmental participation in the Schneider Race began in 1923, when the United States Navy sent a team to England and won the trophy for the first time. In 1924, so recapitulate very briefly a history that must well recall, the American team, with a splendid gesture of abstinence on the part of the Navy Department which was warmly applauded abroad and is still the subject of frequent comment in the British press as a brilliant example of sportsmanship, declined to accept a walk-over. In 1925, Lieutenant Doolittle won a second leg upon the cup. In 1935, the race was not held seriously enough in this country to go to the length of having one airplane built by the industry especially for the competition. The American team went forth with the knowledge that another victory would give this country permanent possession of the Schneider Cup, but victory lacked them.

At that point came the parting of the ways. With the trophy held in America it seemed almost indispensable that some effort be made to defend it. With the trophy sinking the long trip to Italy, a fresh decision had to be taken upon whether there were other technical, political, or moral advantages in preparing for another race and making a serious attempt to win the cup back which would justify the very considerable outlay of time and money necessarily involved. The Navy Department after much consideration decided that the endeavor ought to be made, but it was decided further by the officials bearing the highest responsibility that Congress should be definitely apprised of the Department's intention and that a definite effort should be made to secure funds for the new year's Schneider contest as a special item on the experimental budget in addition to the amount needed for other purposes.

That was the course of action. The desirability of going on with the race for at least one more year and of making a really serious effort to win the trophy in 1937, and to permanently secure it from competition, was consistently pressed upon the attention of the responsible committee of the House of Representatives. They fairly laughed it out of court. It was suggested that there was no more reason for racing an American naval airplane against the airplanes of European air forces than for spending great sums of money in formal arrangement for a race between the fastest destroyers of the American and British Navies. It was suggested that if this concrete proposal to secure funds for the specific purpose of carrying the direct expense of Schneider race participation were approved, the Navy Department

might next want to build an American Cap destroyer. The Assistant Secretary of the Navy for Aeronautics discussed the subject at length with various members of both houses of Congress without discovering more than the faintest evidence of sympathy for the proposal in mature racing. It is then with considerable astonishment that one reads that a member of the very committee which had treated plans for further racing activity so cordially expressed doubts at the prospect that Lieutenant Williams would have to abandon this "vitally important work," while another member of the same committee, equally astounded, announced his intention of taking the matter up on the floor of Congress and of demanding an explanation from the Navy Department. If a life of this enthusiasm had been displayed three years earlier it would have been possible to build a group of racing planes for competition in 1937 under proper auspices, the United States would have had a fair chance of terminating its Schneider Cap participation in a more satisfactory manner, and Lieutenant Williams might have been able to continue to have a share in the development of racing until under conditions far superior to any which he has been able to compare up against the private project.

Senator Tydings, Chairman of the Senate Committee conducting the investigation, is reported to have been dismayed and distressed by the discovery that the Navy Department had for several years deflected some for experimental work in aeronautics with an intent of what the Bureau of the Budget permitted them formally to request from Congress. He and his colleagues could have spared themselves the shock of sudden revelation by making the hearings of the two previous years, in which the unfortunate result of this restriction upon the magnitude of experimental activity was set forth at length. In 1928 and in 1929 the Assistant Secretary of Navy for Aeronautics used up his plans.

"In the multiplication of designs of these classes entirely dependent upon governmental encouragement, we are comparatively and regrettably lagging."

"A more rapid and a more varied technical development in naval aircraft in this country will be necessarily contingent upon the expenditure for research of a naturally larger sum than has been accorded under that heading in our appropriation bills in recent years."

"It is not enough that our position on this matter of the development and encouragement of experimental design is satisfactory, and I assumed it very strongly to the attention of this committee."

International racing of airplanes can be run on either one of two lines. It can be wholly governmental or wholly private. It is very difficult for any private group to compete with the slightest prospect of success against teams liberally backed by their governments. It is quite impossible successfully to promote any individual project on nonpartisan lines, with the work divided between a government department and a corporation. The two are as irreconcilable as oil and water.



ing. These cards must be presented at each lesson and a numbered portion of the margin is torn off or punched as each lesson is given. Unless the instructor neglects to punch the card it is impossible for the student to receive more lessons than he pays for.

For handling the student on the field a booklet is provided, carrying 40 separate tickets, each numbered and each carrying the registration number of the student in question. This book of tickets, along with the student's identification clearance card, serves to check his progress throughout the period of training. It is possible, by using these forms, for the student to climb into the plane as quickly as it has landed and discharged the former student, land the instructor has ticket and proceed with the lesson without any conversation at all, both the pilot and the student knowing, from their study of the course, precisely what is to be accomplished by the lesson at hand. In connection with the forms which have been mentioned there are 38 separate booklets, each dealing with a particular lesson or some phase of ground or flying instruction. If the student uses, according to his clearance card, that the next lesson will be number 13, he studies booklet number 13 (or whatever booklet applies to lesson 13), before approaching his instructor. Of course the instructor in a school using this system has already studied through the lesson rather thoroughly and gives them in exactly the manner in which they are outlined in the booklets.

This plan has been found to save 25 to 50 per cent of the flying instructor's time and indeed it has been found possible for one instructor to give as many as 35 15-min. lessons in one day in the Rankin School of Flying, at Portland, since the adoption of this method. While it is unusual for one pilot and plane to handle so many lessons during one working day, it is of the utmost importance to know that such a large amount of work can be accomplished in an emergency by the use of this system.

**I**N HANDING the Rankin System of Flying Instruction available to schools of the country, a separate system for handling this course was set up. This work is performed by a separate company known as the Rankin System, Inc., which company sells the courses to the licensed schools and pays a royalty to the Rankin Aeronautical Corporation on all courses sold.

Just as each sub-dealer of an automobile sales organization signs a contract with his distributor, agreeing to sell a certain number of automobiles within a given period, so the schools licensed by the Rankin System sign a contract agreement covering the giving of this course of instruction in three schools and agreeing to accept a certain number of courses with the granting of the franchise and thereafter a minimum number of courses each month. It is of interest to note that the average income of the Rankin System, Inc., from each licensed school has been \$1000 per month, indicating that approximately 1000 students per month are being handled by each school licensed to use the Rankin System.

When signing the contract agreement each licensee agrees to keep books on all records supplied from students for flight and ground training given under the Rankin System and further agrees to furnish to the Rankin System, Inc., a monthly statement covering the operation of the school. The agreement further provides that all planes and pilots used by schools so licensed must be licensed by the Department of Commerce. In the near future it is anticipated that no school will be

permitted to teach the Rankin System unless it has obtained the certificate of approval now being issued by the Department of Commerce. A further paragraph of the agreement carries the provision that no instructor employed by a school using the Rankin System shall be permitted to teach flying at the same time in some other unlicensed school. In return for the agreement of the licensee to accept a minimum number of courses each month the Rankin System, Inc., gives exclusive territorial rights to the licensee with a provision for sub-licensing of other schools throughout that territory. When other schools are so sub-licensed the Rankin courses which they buy and use in connection with their work are obtained through the representative Rankin school in that territory rather than direct from the Rankin System, Inc. at Portland.

**I**N HANDLING these courses and forms, each complete set of which sells for \$25, all courses are sent out in a box and the keeping of a complicated set of books is quite unnecessary in connection with the national distribution of these courses.

In co-operating with the schools which it licenses, the Rankin System, Inc., agrees to furnish cards and advertising mats to these schools which wish to advertise. These are furnished more cheaply than they could be obtained elsewhere and are of a standard character which serves to enhance the value of the school's advertising. At the same time no license is permitted to advertise that it has any direct connection with the Rankin System, Inc. or is in any way a branch of that organization, each school being a separate institution.

This method of handling the courses to many independent schools provides opportunity for bettering instruction and methods of giving instruction in the various schools using the Rankin System. While in a general way all schools follow the fundamental Rankin System, in many details of the school work certain organizations develop new and improved methods and all licensed schools are encouraged to send in suggestions for the betterment of the course or methods of giving it. Where these suggestions are found to be helpful they are incorporated in the system and broadcast thereafter to all schools licensed under the Rankin plan. Furthermore, any invention which one school may have, or any advertising, literature, information, etc., may be forwarded to Rankin headquarters, Portland, and distributed from that point to all other Rankin schools, the result being that all Rankin schools are each entirely independent of any other, at the same time there is a uniform wide co-operation in the interchange of ideas which tends to insure a uniform standard of conduct among the various schools.

As a guarantee to students at schools licensed by the Rankin System, Inc., that they will receive the system developed by Tex Rankin, traveling representatives visit the various schools determining that instruction is being given as outlined by Rankin officials. When a school is found not abiding by the contract agreement to license is immediately revoked.

While the Rankin System, Inc., does not in any way pretend to be a large chain of flying schools controlled under one management by a single central organization, it does provide a uniform system for the handling of students, which if followed gives the schools licensed to use this system a standard of instruction of uniformly high quality and a system of giving instruction which is uniformly efficient.

## Standardization OF SMALL ENGINE PARTS

By JOHN F. HAREBECKER

Chief Engineer, Vought Aircraft Factory

**E**NTIRELY APART from the inherent value of standardization per se, there are in the current aeronautical situation certain general factors that have led to establish the present as an extremely propitious time for the introduction of standardization activity into the aircraft engine hardware field. The industry is in the midst of a period of detail refinements and production economies, with perhaps the first opportunity in years to afford the time and effort to look forward to the future, unhampered by a pressure of immediate production demands that break "you time out," no matter how promising the vista of calm anticipation.

It has been reasonably well established that in any standardization activity there is a need for a crystallized proposal, something to shoot at, as it were. No matter how trained the engineers or experts, if they are brought together cold, without previous preliminary investigation to provide a basis of discussion, little of a concrete nature will emerge from their considerations. In fact, relatively minor points will often provide the sole basis of discussion, while the real major considerations will go neglected. This is perhaps frequently due to a too ready assumption that major points must naturally be in agreement, particularly in an industry which has so steadfastly fostered large scale production methods. Therefore, when detail investigation discloses that this is not necessarily so, there is a resultant confusion of thought which seriously handicaps any real meeting of the minds.

It is richly with the thought in mind of providing that necessary detailed analysis, brought together in such a measure into a definite proposal, that the tentative standards outlined in this article are presented. They are in no wise to be regarded as naive or less final proposals, to be either accepted or rejected in toto, but merely as definite focal points about which to enter discussion. They represent primarily the inevitable compromise necessary in standardization based more particularly on a series of agreements with past practice, and in no instance do they indicate the introduction of any new or radical ideas based on personal opinions of what might be desirable.

It is felt that in order to have a proper chance to see real standards should represent a consensus of change, consistent with good design and common sense. New ideas, experiences, designs, principles, and methods of materials should be encouraged at all times, but they have

*In a previous article (AVIATION of Nov. 23rd, 1929) the author discussed the need and advantages of standardization in the small engine parts field, with a detail analysis of the extreme variation in design, tolerances and materials in a few representative parts. In this article he carries that analysis to a logical conclusion, presenting certain definite tentative proposals, indicating the detail basis of each conclusion, so that the industry may have a concrete tangible starting point for its consideration of standardization.*

no definite place in a standardization program until they have first established themselves as experimental applications and service tests. Last this may create the idea that standardization means that standardization results develop next, it is only reasonable to add that the application of any standard in aeronautics has never been made mandatory by any controlling agency in aviation. The fundamental idea in that standardization and experimental are best left divorced for all time for the normal advantage of both.

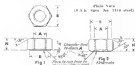
Before proceeding into the detail analysis of the actual small engine parts and the conclusions drawn in each instance, it may be well to state certain general base principles which have been applied to all cases. Whenever any previous standards are contrasted, either in the aeronautical, automotive or general industrial field, or where there is a recognized commercial practice, every effort has been made to bring the tentative standards into widest agreement, with the possible exception of the Tentative American Standard for bolts and nuts, which will be discussed more fully under bolts and nuts. While each item has been considered and analyzed separately, due consid-





diameters from 3/4 in. (1.88) to 7/16 in. (4.27) in. and the lengths of the shafts varied from 1/4 to 4 in. As the odd sizes and extreme diameters and lengths were the majority rather than the rule, the standard sizes were adopted as well as lengths advancing by increments of 1/4 in. up to a maximum in each size which was found to have been generally used.

In selecting the material, out of 140 specimens, 60 per cent had no particular grade of steel specified. This per



A	Overall Length	White Zinc	Gr-5	B	H
1	1/4	0.0000	0.0000	0.0000	1/4
2	1/2	0.0000	0.0000	0.0000	1/2
3	3/4	0.0000	0.0000	0.0000	3/4
4	1	0.0000	0.0000	0.0000	1
5	1 1/4	0.0000	0.0000	0.0000	1 1/4
6	1 1/2	0.0000	0.0000	0.0000	1 1/2
7	1 3/4	0.0000	0.0000	0.0000	1 3/4
8	2	0.0000	0.0000	0.0000	2
9	2 1/4	0.0000	0.0000	0.0000	2 1/4
10	2 1/2	0.0000	0.0000	0.0000	2 1/2
11	2 3/4	0.0000	0.0000	0.0000	2 3/4
12	3	0.0000	0.0000	0.0000	3
13	3 1/4	0.0000	0.0000	0.0000	3 1/4
14	3 1/2	0.0000	0.0000	0.0000	3 1/2
15	3 3/4	0.0000	0.0000	0.0000	3 3/4
16	4	0.0000	0.0000	0.0000	4

Apply to either side or end of shaft

cent of the material specified was found to be SAE 3140 steel, and this material predominated over a large variety of material and grades that were specified.

A TOTAL NUMBER of 316 plain washers representing 10 manufacturers was considered in determining the design for the proposed engine washer standard. All specimens appeared to have been designed for use in conjunction with a standard size bolt or stud and nut.

In a small percentage of the specimens the bolt hole clearance varied from a few thousandths to a very loose fit. However, by close examination of the majority it was found that the clearances were practically constant. That is, the clearances averaged 1/64 in. for the smaller sizes and 1/32 in. for the larger sizes. As these clearances appear to have been widely met even on very fast work, no attempt has been made to alter them.

A study of the outside diameters revealed that this was reflected in a great measure by the width across the corners of the nut or bolt at the same nominal size. Since the old SAE standard is proposed for both nuts and a predecessor, majority of the washers examined are also designed, the washer proposed follows this design, being roughly 1/16 in. larger than the distance across the corners of the nut, modified to provide a consistent series of outside diameter washers.

On account of 45 per cent of the specimens having a slight chamfer around the outside edge this feature is included as optional. As to material, a majority of specimens which were of steel were equivalent to SAE 1035

and there appears to be no reason why this material would not be satisfactory.

ONE ROUNDED AND FIVE specimens of lock washers representing nine manufacturers were compared and considered. With the exception of a very small percentage, the specimens were either designed in accord with the SAE Standard lock washer or designed with but very slight variations from the same. In view of this, the SAE Standard is recommended, including the SAE temper and toughness requirements.

A very logical note to the effect that "washers having contact surfaces scarred or otherwise roughened or pitted, or washers having ends abruptly turned up to present a sharp edge to enter the washer hole will not be accepted" was found on some manufacturers' drawings. This is proposed for inclusion in the standard.

FIFTY-FIVE specimens of Woodruff keys representing nine engine manufacturers were tabulated and compared. Ninety-five per cent of the specimens were designed similar to the SAE Woodruff key, excepting for a few occasional variations in dimensions. In view of this fact, the adoption of the SAE Standard Woodruff key without revision, is recommended.

In 85 per cent of the specimens the material specified was commercial steel, and there appears no logical reason why this should be deviated from. It may also be noted that in certain quarters there is a distinct revision to the use of Woodruff keys in engine work, but such prohibitive expression is not a part of standardization activity.

IN CONSIDERING 35 specimens of lock rings, representing five different manufacturers, it has been difficult to discover any general statement of change from size to size. This is due no doubt to the fact that each of the rings have, in most cases, been detailed to suit some particular condition. However, by laying out the ring dimensions, material thickness and other pertinent data in graphic form, it was possible to recognize greater tendencies toward certain features. The tentative standard

Max. Diameter	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1/4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1/2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3/4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1 1/4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1 1/2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1 3/4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2 1/4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2 1/2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2 3/4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3 1/4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3 1/2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3 3/4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Proposed Series											
1/4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1/2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3/4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1 1/4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1 1/2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1 3/4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2 1/4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Apply to either side or end of shaft

White Zinc (S.A.E. Spec. No. 1114 steel)

has been made up to embody the most outstanding features as shown by these graphs.

As the material for a large majority of specimens was specified as steel spring wire, this was adopted. A marking of enduses or size has been included to present a more rounded, despite the fact that this was present in only a few instances. This is considered preferable to omitting.



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tubes with the rod as shown in order to slightly expand the tubes and prevent the withdrawal of the rod.

There is nothing to hold the expanded or rod only in contact with the die, except the wall of the tube. There is always a possibility therefore, that the wall may become slightly thinner on one side than on the other. Fortunately, this condition tends to correct itself, since the thicker portion of the wall will become harder during the process of drawing and therefore will tend to push the standard over toward the thicker and softer side leaving the hole concentric with the outside surface.

At an early date aircraft manufacturers began to ask the tube mill to make special shapes such for example, as the streamline section. This presented new difficulties to the manufacturer of round tubing, although the specialty mill had long been making tubing of a great variety of shapes, including square, elliptical, oval and even triangular. The production of the streamline form at first gave trouble, but has, however, been entirely solved. The tube is first drawn to a certain diameter in the round

and purposes, but their sharp corners were not desirable from the standpoint of the aircraft engineer.

At the suggestion of Mr. A. E. Larson, of the Paco Aircraft Company, a tube was developed, having moderately round corners. This gave a better support to the side walls against buckling under compression or



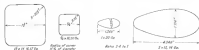
Universal tubing machine for round and special tube. Two roll action inside supports and pressure mounted dies in dies. Roll set of plates for various internal diameters on worktable. Roll set machine at left for drawing laminated tubing. Roll set machine at right for drawing mechanical tubing. Machine used to every diameter between four to avoid square appearance of cold drawn steel tubes. Drawing of left outside tubes inside roll and at end using rotating die and roller belt. These every prepared tube is sent to another mill where it is drawn to final diameter. Machine rolls tubes in exact alignment with Herbert controller.



and then drawn through a die of streamline shape, but of sufficient proportions to insure forming it to the desired contour without causing a caving in of the relatively flat sides.

For a given outside diameter (across flats) and the same weight per ft., square tube is considerably stiffer as a column or beam, than round tube. Furthermore, the square section has certain advantages in design and fabrication. It is easier to make correct joints and the flat surfaces provide better means for connecting clips, washers, etc. Square tubes have been manufactured for years for certain aircraft

the corner line of the elliptical. This makes a very efficient beam and one which is said to be as light as a corresponding space beam of equal depth and strength and of considerably less cost than a corresponding beam made of chromalium or other aluminum alloy. Other special sections are the flat sided oval having half round

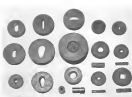


Examples of special square and diamond sections in square tubing

ends and flat sides which has been employed for use on grid floors and other parts by the Keystone Aircraft Company and others, and the triangular used for radiator shutters. When the demand is sufficiently great to cover the cost of dies and all preliminary experimental work, nearly any reasonable section can be produced.

One of the most annoying experiences of the aircraft manufacturer is to make up a part, such as an axle, a section of landing gear or even a fuselage and then to find that one or more tubes of the structure are mechanically defective. These defects are likewise a liability to the tube manufacturer.

It has been seen that the conscientious manufacturer takes every reasonable precaution to prevent defective tubing from entering into production by a careful examination of the raw material. He furthermore inspects every such of tubing before shipment in order to detect and reject any defective tubes which may have come through production. Some of the defects, however, are exceedingly difficult to see. Up to the present time other methods of detection of flaws, such as magnetic analysis, have not reached the stage where they can be entirely depended upon. The type of defect known as a "longitudinal seam" may be practically invisible at the



Typical dies and mandrels for tubing in round and square shapes. Crown, lower die with mandrel placed within it, drawing material over them which they pass and which determines wall thickness. When series of dies entering die, with and view of mandrel showing drawing into the die and view of die. Dies to left, mandrels die head and back size. The left mandrel for wire drawn and to right of it, dies rolled for roll-die stations. Lower right, diamond shape with mandrel.

time that the finished tube goes across the inspection table, because of the fact that a very thin layer of material has been squeezed over it in the final process of drawing. When such a tube is heated, as in welding or bending, or when it is exposed to the pulling process



Corner of finished round cross-section showing only a few of the numerous defects and flaws exposed by the hot-drawn process. Defects shown here from drawing of the outside of the tube and inside. Work is completed before drawing and grinding to avoid detection. These defects are not visible.



corner pinning, this layer of material may be removed, exposing the so-called "seam." This is really nothing but a very thin crease ordinarily of negligible depth, which extends along the length of the outside surface or sometimes along the inside surface. It is usually due to a small crack or a pipe or other mechanical defect in the tube from which the original bar of steel was made, or to a blow or crack or crease in the hot rolled tube, therefore having been present in the raw material when it came to the cold drawing mill. A single tube which has such a defect and which passes preliminary inspection and enters into production, may produce as many as a dozen or more tubes of smaller diameter or thinner wall. Such a surface crease may be of no serious consequence to the strength of the tube, but it nevertheless constitutes a nuisance as it may spread, under















## PERSONNEL

**PART BARRER**, former president of Benth Aircraft, has been made general manager of Comproco, a manufacturer of Transports, in Tuxtilla, Mexico which operates a Mexico City-El Paso line. The company is a subsidiary of Denver Aeronautical Corp.

**MAJ. ROSS G. LAMAR** has been appointed chairman of the aviation committee of the Illinois Chamber of Commerce.

**J. W. LEWIS**, of Clark & Lewis, Omaha, Neb., has been elected president of Mid West Aviation Corp., representing LORAINER ENGINEERS, Inc., in St. Louis and will continue his duties as treasurer of the company.

**W. A. HITCHCOCK**, Syracuse, N. Y., has been made senior district manager for American Eagle Aircraft Corp. He was formerly sales manager for Aeroflex, Inc., and with the Whittaker Map Co.

**LOREN CO. HOSKIN** (Towhee) has been appointed flying director of the aeronautical equipment and development department of Otisair Corp., Los Angeles, Calif.

**GEORGE E. STONE** (aircraft purchaser) is president of the Aircraft Division of American Airways, but has been appointed in the position of purchasing agent for Robertson Division of Universal Transit.

**A. R. LARK**, formerly secretary of the Alameda Chapter of Comproco, Oakland, Calif., has been appointed assistant manager for Western Air Express, with headquarters in San Francisco and Los Angeles.

**A. ALLEGRA** has been elected president of Greater Airplane Association, Akron, Ohio.

**RICHARD M. MOSE**, consulting engineer with Grant-Bell Engineering Corp., Worcester, Mass., recently has been the past seven months, is in the United States on a business trip of four to six weeks. His headquarters are at 109 Van Ness Street, New York, N. Y.

**MR. MOSE** was formerly engineer with the Bellanca Company, and before that technical editor of *Aircraft*.

**RAUF D. PASCIA**, automobile race driver, has joined the engineering staff of American Crown Engines, Inc., Detroit, Mich., and will devote his time to the development of aircraft engine superchargers.

**RONALD MACALUSKY** has been appointed sales manager of the aircraft division of the Packard Motor Car Co., Detroit, Mich., in charge of distribution of Packard Diesel engines. *Continued on page 663*

**W. C. MYERS**, formerly with Skyways Inc., Boston, has joined the Packard company's aircraft division as the production department.

**JOHN C. ELLIOTT** has been appointed general manager of American Viscumeter Co., Inc., New York, N. Y., subsidiary of General Motors Inc. He was formerly general manager of the McCrometer Co. The

American Viscumeter Co. manufactures and distributes its instrument to measure the viscosity of oil and engine

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## AERONAUTICAL CALENDAR

May 25-26 26th-27th Eastern Air Show, Long Beach, Calif.

May 28 28th-29th Eastern Air Show, Long Beach, Calif.

May 29 29th-30th Eastern Air Show, Long Beach, Calif.

May 30 30th-31st Eastern Air Show, Long Beach, Calif.

May 31 31st-1st Eastern Air Show, Long Beach, Calif.

June 1 1st-2nd Eastern Air Show, Long Beach, Calif.

June 2 2nd-3rd Eastern Air Show, Long Beach, Calif.

June 3 3rd-4th Eastern Air Show, Long Beach, Calif.

June 4 4th-5th Eastern Air Show, Long Beach, Calif.

June 5 5th-6th Eastern Air Show, Long Beach, Calif.

June 6 6th-7th Eastern Air Show, Long Beach, Calif.

June 7 7th-8th Eastern Air Show, Long Beach, Calif.

June 8 8th-9th Eastern Air Show, Long Beach, Calif.

June 9 9th-10th Eastern Air Show, Long Beach, Calif.

June 10 10th-11th Eastern Air Show, Long Beach, Calif.

June 11 11th-12th Eastern Air Show, Long Beach, Calif.

June 12 12th-13th Eastern Air Show, Long Beach, Calif.

June 13 13th-14th Eastern Air Show, Long Beach, Calif.

June 14 14th-15th Eastern Air Show, Long Beach, Calif.

June 15 15th-16th Eastern Air Show, Long Beach, Calif.

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June 17 17th-18th Eastern Air Show, Long Beach, Calif.

June 18 18th-19th Eastern Air Show, Long Beach, Calif.

June 19 19th-20th Eastern Air Show, Long Beach, Calif.

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June 22 22nd-23rd Eastern Air Show, Long Beach, Calif.

June 23 23rd-24th Eastern Air Show, Long Beach, Calif.

June 24 24th-25th Eastern Air Show, Long Beach, Calif.

June 25 25th-26th Eastern Air Show, Long Beach, Calif.

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July 29 29th-30th Eastern Air Show, Long Beach, Calif.

July 30 30th-1st Eastern Air Show, Long Beach, Calif.

August 1 1st-2nd Eastern Air Show, Long Beach, Calif.

August 2 2nd-3rd Eastern Air Show, Long Beach, Calif.

August 3 3rd-4th Eastern Air Show, Long Beach, Calif.

August 4 4th-5th Eastern Air Show, Long Beach, Calif.

August 5 5th-6th Eastern Air Show, Long Beach, Calif.

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August 15 15th-16th Eastern Air Show, Long Beach, Calif.

August 16 16th-17th Eastern Air Show, Long Beach, Calif.

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August 22 22nd-23rd Eastern Air Show, Long Beach, Calif.

August 23 23rd-24th Eastern Air Show, Long Beach, Calif.

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August 25 25th-26th Eastern Air Show, Long Beach, Calif.

August 26 26th-27th Eastern Air Show, Long Beach, Calif.

August 27 27th-28th Eastern Air Show, Long Beach, Calif.

August 28 28th-29th Eastern Air Show, Long Beach, Calif.

August 29 29th-30th Eastern Air Show, Long Beach, Calif.

August 30 30th-1st Eastern Air Show, Long Beach, Calif.

September 1 1st-2nd Eastern Air Show, Long Beach, Calif.

September 2 2nd-3rd Eastern Air Show, Long Beach, Calif.

September 3 3rd-4th Eastern Air Show, Long Beach, Calif.

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# AIRPORT CONSTRUCTION PROJECTS

**ALABAMA** (A) is left at the Alton Municipal Airport by the Mobile State Air Line, Inc. The building, which will be about 100,000 sq. ft., will contain an office, storage, repair shop, and waiting room in addition to plane-storage space. The Alton City Council has authorized the employment of architect to draw plans for an administration building to be built at the municipal port at a cost of about \$40,000. At Hartsfield (M) plans are being developed for a 330-acre airport, an which more than 100,000 ft. will be spent. The port is to be added 100,000 ft. and is expected to be completed in 1965. A \$20,000, 100,000 administrative building, complete lighting system and a repair shop are among the features planned for the port.

Parlin Airports, Inc., Kansas City, Mo., has preliminary plans completed for construction of a regional center administration and terminal building at Rosecrans Field, St. Joseph, Mo. to be 400,000 sq. ft. and cost \$1,000,000.

The Board of Park Commissioners of Wichita, Kan. is considering bids for the erection of a three-story administration building, containing 250,000 sq. ft. at the Municipal Airport to cost about \$25,000.

Grading and filling at St. Louis Municipal Airport is almost complete so the result that the port now has available approximately 360 acres of level landing area.

At Council Bluffs (IA) Municipal Airport, drainage tie is being installed on the N.W. 1/4 runway. Thirteen miles of tie will be used for the purpose.

Lewiston, N.H., is considering bids for establishment of a pump house at the municipal airport.

DeWitt, Ia., has decided to establish a municipal airport.

Port Worth (Tex.) Municipal Airport is to have a three-story building containing offices, waiting rooms, a restaurant, baggage claim, ticket office, lounge and a weather bureau. W. G. Clark, architect is drafting plans for the building which will contain 130,000 sq. ft.

The Nashville (Tenn.) Advisory Committee has recommended that \$250 be spent for asbestos engineering work on the proposed municipal airport. A \$100,000 bond issue for the project will be voted upon in June.

The McMinn (Tenn.) Airport advisory board has let a contract to the International Derrick and Construction Co. of Columbia, Mo. for construction of an all-steel, six-phase hangar measuring 70 x 100 ft.

Waco, Tex., is to have a 220-acre airport located 14 blocks from the city hall when the plans of the newly incorporated Air Services, Inc., materialize. The port is to be known as Cox-Tex Field.

The Greenville (S. C.) Municipal

Airport is undergoing improvements in the way of grading and taxiway, and will be about 100,000 sq. ft. in area.

At the Curtis-Wright Field, Detroit, Mich., between Thaw and North Wells, the International Airport Corp. will erect administration buildings, hangars, etc., in the new future. Birmingham (Ala.) City Commission will take bids on improvements for the 300-acre municipal airport to include administration building and hangars.

Lynchburg, Va., is considering bids for construction of 600,000-sq-ft hangar at the municipal airport and 100,000-sq-ft hangar for a hangar measuring 60,000 ft.

Flint, Mich. (Ala.) Officials have selected a 100-acre site for a municipal airport, one on which will begin shortly.

Work on the Northbrook (La.) Municipal Airport started recently. About \$35,000 is to be spent on the field, which comprises 200 acres.

The city of Knoxville, Tenn., has appropriated \$70,000 for the construction of hangars at the McGhee Tyson Airport.

At Memphis (Tenn.) Municipal Airport, concrete aprons measuring 250 x 250 ft. are being laid out on the front of the city hangar at a cost of about \$5,000.

The Detroit (Mich.) City Council recently voted \$250 and the Chamber of Commerce, \$500 for improving the land airport.

At Newport, Conn., a 3-in.-x 4-in. log pile is being developed on the approach end of the airport. Country Club, Inc. is said that 50,000 tons of mud are being pumped onto the field for surfacing. Adjoining the field is a truck lane where airplanes may stop.

A 300-acre site at Bogalusa, N. Y., has been acquired by Wilbur & Vance, Inc., president of Hiram Bogalusa, Inc. Two terminals, a hangar, and a lighting system are projected at a cost of approximately \$40,000.

Madison, Wis., is considering the establishment of \$20,000 airport, including erection of hangar.

The Los Angeles Bureau of Construction will erect a 100,000-sq-ft hangar at the municipal airport.

At the Exeter (Calif.) Airport a 100,000-sq-ft hangar is under construction.

## AVIATION April 26, 1959

The Lewistown (Pa.) Airways and Airways, Inc., has started a 70-acre tract of land 3 mi. west of the city and will begin the construction of an 80 x 80 ft. concrete hangar.

The York (Pa.) Flying Service has leased a 40-acre site to serve as a hangar for the city's projected flying operations.

The London (Ont.) Airport will shortly have constructed three additional runways of approximately 3,000-ft. each.

Patterson, Pa., is to have a municipal airport located within 20 acres of the city and consisting of 800 ft. x 1,000 ft.

At World Chastain Field, Mississippi, the State Oil Co. has leased a 100 x 150-ft. plot, adjoining the flying field, for use as an auto driveway so the plot, on which it will erect a construction plane and automobile flying station.

At the John R. Airport, Detroit, Mich., operated by the Robert H. Anderson Co., a twenty-five hangar is under construction, and a 3,000-ft. runway is being graded.

The Greenville (Mich.) Association of Commerce has selected a 100-acre site for an airport.

Klamath Falls, Ore., is reported to have voted funds for construction of an airport, and to have let the contract for planning the site. A \$15,000 hangar is included in the improvements to be made.

The city engineer of Kingleigh, Okla., has prepared preliminary plans for a \$25,000 hangar to be erected at the municipal airport.

Looking at the River (Idaho) Municipal Airport, a road is being built, and a system of drainage is being installed.

North Bend, Ohio, has had a three-phase hangar built on a recently acquired 220-acre airport. A road to the site is now under construction.

The City Council of Portland, Ore., has let the contract for construction of a municipal airport building for approximately 100,000 sq. ft.

At the Santa Paula (Calif.) Airport, James Shivers has begun the erection of a frame and completed two hangars. He is also considering the establishment of \$20,000 airport, including erection of hangar.

The Los Angeles Bureau of Construction will erect a 100,000-sq-ft hangar at the municipal airport.

At the Exeter (Calif.) Airport a 100,000-sq-ft hangar is under construction.

## Airports Dedicated

April 9: 10:00 A.M. Municipal Airport, April 11: 11:30 A.M. Curtis-Wright Field, Detroit, Mich. (Detroit and North Wells); April 12: 10:00 A.M. (Ala.) Municipal Airport, April 13: 10:00 A.M. (Calif.) Municipal Airport, April 20: 10:00 A.M. Park Field, near San Diego, Calif.

## AVIATION April 26, 1959

### P.A.A. Gets Contract For Veneer Service

NEW YORK (A.V.)—Pan American Airways has secured from the Venetian government, a contract covering the construction of a new airport terminal and new Venetian. This will increase considerably the effectiveness of the Pan American service from its new base of South America to become the planes on the Cranio-Cranio line from its past the Venetian coast line in California without stopping. A new service will be launched between April 25 and May 2.

Mexico and Puerto Rico will be the new parts of call. The bus is expected to be a weekly basis and will be launched June 21, last year. Pan American can offer eventually to push it through to Pan American in Dutch Gains, thus making a complete circle around the Caribbean area. The Venetian's contract will run for five years and Pan American has options of renewing for one additional five-year period.

### International Starts Coast Line

LOS ANGELES (CALIF.)—Bogalusa, La. first coast service, a regional weather station is to be established at Home, probably about July 1. After the Home station is in operation (which is under construction) will be set up along the 6000 route between that city and Portland. Contract plans will be at the two cities with under construction with secondary work along and off the course for the following and broadcasting of weather bulletin.

### Colonial Reports Revival

NEW YORK (A.V.)—Colonial Division of American Airlines, Inc., completed the first year of its airport service between this city and Boston on April 13. Colonial reports that the company's 11,000 passengers were carried. The busiest weekly period during the first week of April when 453 were carried. Thru and local trips daily are made on most of the original two and extra sections are often necessary. During the first year of its airport service, Colonial reports that the company's 11,000 passengers were carried. The busiest weekly period during the first week of April when 453 were carried. Thru and local trips daily are made on most of the original two and extra sections are often necessary.

March 30, plans operated by Canadian Colonial Airlines between New York and Montreal, which is to be completed by April 15.

Portland (Ore.)—Early as May Varsity Air Lines will initiate a passenger service in conjunction with the line between Portland and Salt Lake City, Utah. D. Caldwell, vice-president in charge of operations, has announced. Portland will be the same schedule as when it was inaugurated to carry the road in separate plans and keep on-going flights for passengers. However, for the time being, the Boeing planes will be employed.

Portland, Ore. first coast service, a regional weather station is to be established at Home, probably about July 1. After the Home station is in operation (which is under construction) will be set up along the 6000 route between that city and Portland. Contract plans will be at the two cities with under construction with secondary work along and off the course for the following and broadcasting of weather bulletin.

### Sprinkler Starts Planes at Newark

NEWARK (N. J.)—The design system demonstrated before a large group of airport specialists for full upon completion of the Colonial hangar here recently were not when a short circuit started a blaze within the wing at a Portchell. The fire was quickly brought under control by the fire department. The wing had been killed. A Sprinkler, Portchell Portchell and a Douglas engine extinguished and the loss on the hangar plane was limited to a few hundred dollars.

### Alaskan Weather Service to be Installed

WASHINGTON (A. C.)—So, hundred miles of Alaskan planes are to be provided with government weather service, week commencing July 1. C. J. McGee, assistant meteorologist who has had charge of weather observations at Helling Field, has been assigned the 3-year task at developing a weather service on a basis between Nome and Fairbanks.

No weather forecast facilities exist at Nome, but there is a station at Fairbanks. A first coast service, a regional weather station is to be established at Home, probably about July 1. After the Home station is in operation (which is under construction) will be set up along the 6000 route between that city and Portland. Contract plans will be at the two cities with under construction with secondary work along and off the course for the following and broadcasting of weather bulletin.

### First Los Angeles Features

The new Los Angeles terminal of W.A.E. is located on a 100-acre tract in the city of Los Angeles. The Pacific Electric International Bus Co. has been under construction for approximately 100,000 sq. ft. and will be a runway 100 ft wide and 3,000 ft long extending diagonally across the field in a northeast-southwest direction. Taxi lanes and parking or waiting areas will be similar all around the paved.

The passenger and administration buildings and the terminal are being constructed by a copper shattering the capital. It contains a large terminal passenger lobby and waiting room, baggage claim, ticket office, offices, rest rooms, restaurant, railroad, weather bureau, and dispatcher's office. The new terminal is being constructed on a site on the airport and regular operations are conducted after dark with both mail and passenger planes.

### OKLA. to Have New Services

TULSA (OKLA.)—Beginning May 15, the recently completed Oklahoma State Line Airways, Inc., will operate from Tulsa. The first coast service will be launched within the state. They will radiate from Oklahoma City in northern, southern and western directions. Tulsa service will be maintained. Schedules and ratings will be announced later.

### W.A.E. Dedicates Los Angeles Port

LOS ANGELES (CALIF.)—Western Air Express, Inc., of this city, dedicated its Fairbanks, Alaska, terminal at its site on May 10, 1959. The Los Angeles terminal (it has been in use for some time) is a 100,000-sq-ft building, approximately 100 ft wide and 3,000 ft long extending diagonally across the field in a northeast-southwest direction. Taxi lanes and parking or waiting areas will be similar all around the paved.

The passenger and administration buildings and the terminal are being constructed by a copper shattering the capital. It contains a large terminal passenger lobby and waiting room, baggage claim, ticket office, offices, rest rooms, restaurant, railroad, weather bureau, and dispatcher's office. The new terminal is being constructed on a site on the airport and regular operations are conducted after dark with both mail and passenger planes.

W.A.E. began operations April 17, 1958, by inaugurating an air mail service between Los Angeles and Salt Lake City, Utah. Douglas mail service was launched on this route whenever mail loads permitted. In December, the line was extended to Denver. Two-way service will be maintained. Schedules and ratings will be announced later.

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## SIDE SLIPS

By  
Robert R. Osborn

THEY COME to the New York World every two weeks for an hour on the conversation between some shiny new flying students and their girl friends.

His version of an advertisement appearing in the March 16th issue, discovered by J. A. H., of Brooklyn, N. Y., reads:

"Take off on your flying career where Lindbergh, Chamberlain and Byrd took off!"

Our striking correspondent of the Pacific Coast, Mr. C. P. York at San Francisco, Cal., sent such the following: "A local paper gives considerable space in its weekly Aviation page to a complete technical description of the Curtiss 'Tanager.' Among other paragraphs appears the following:

"When completely stalled the 'Tanager' can be tilted from one side to the other with only slight yawing tendencies, which are in the proper direction."

How hard that plane must get with the pilot who attempt to demonstrate to his lady friend that she should know it will be taking up an landing gear, piloting its prop on the shore strand and going slowly to sleep in mid-air. (In real experience, I should think, would be inevitable leads to determine which is the proper direction for yawing. Easy! But should be informed of that and possibly we could get up an astronomical look of sports.

At any rate, the yawing characteristics of the Tanager suggest the skapan. "We mechanical—dy a Tanager and he side ones when sleep!"

Aside to the Advertising Manager: Bill the above space to the Curtis Company at the usual rate, and leave half of the fee on our desk.

From J. H. D. of Tampa, Florida, comes a clipping from a Florida paper, telling of an attempt shortly to be made by Mr. "Red" Jackson to fly an airplane across the Gulf of Mexico in a solo endurance record. The headline on the article says "Must Hold Their On Its Back 26 Hours In Air" and Mr. J. H. D. wishes to know if we think he can do it.

It might be possible by the use of a combination tin-bird and Heli-Skinner, but we are sure that any other birds would be much too noisy.

### OUR MARINA FLYING DEPARTMENT

A friend of ours reports that he got himself completely lost in a fog on a cross country jaunt. After he found a hole in the ceiling to drop through he couldn't recognize at all any of the country landmarks. After wandering around for some time he found a small town with a railroad station but couldn't make out the name of the station. After several drives at the station, each time getting lower he still couldn't make out the name. Finally he made one more drop which nearly took the shingles off the roof and that time he did make out the sign. It read, "American Railway Express."

Pilots who learned to fly in Texas which had an empty five centimeter in their risk insurance board equipment, will probably regret under their belts something about the proposed modern generation when they read that the pilot who made a night landing on a lighted field and "it was learned that he landed without a back elevator, a last-of-its-kind remark in the literature." The story was sent on by Payroll Service No. 9836 at Nashville, Tenn.

Mr. C. E. N., an editorial colleague claims that aeronautics is afflicted not only with delusio who are carrying electric motors for the first time in history but that we seem to be suffering from a "first" complex all through the industry. He has collected the following set of "aeronautics firsts" in one month:

"Nap Flamingo Airlines"—has the distinction of being the first woman to sail a plane across Atlantic territory." (Correspondent)

"Mr. Whelan is one of the nation's first pilots, having learned to fly at the old Wright school at Dayton, Ohio, where the first hangar in the world was built in 1913." (The New York American and Transit release)

"First college in the south to organize active sports club." (Pittsburgh Courier from William and Mary college)

"The first man to the Throes to fly over the historic ruins of the Seven-Elphs—the Prison of Wales to his Gipsy Moth alone Wanda Clark"

(Picture caption reproduced from London Illustrated News)

"General City Mch. with a population of less than 3,000 claims the dis-

covery of staging the first road town airplane show in the state or in the middle west." (Correspondent)

"On S. Chalmers first man in particular an airplane for use in the first island." (Flight)

"The first power glider to appear at a flying show here." (K.C. Correspondent)

"First man over photographed in the wild by an air photographer." (Caption in Sportsman Pilot)

"An airplane was said to be a house for the first time in the hands of Rocky Mountain aviation." (Denver Correspondent)

"First Edwards' chief of the Perma make, is believed to be the first Indian to fly an airplane. Edwards took up the study of aviation in 1910 and is now recognized as an experienced flyer." (Newspaper item)

"This is the first time a prize of the Royal Aeronautical Society has been won by a woman." (British Correspondent)

"This is the first costume in Siam of a person being used with an air chute." (Irving Air Clubs Co. release)

"Lady Bennett is said to be the first woman in Australia to own her own machine." (Flight)

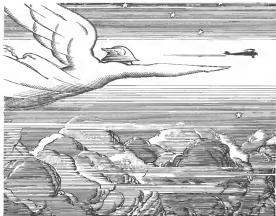
"An airplane squad of four Denver policemen has been appointed as Denver's first step to cope with gunners, bombs and other underworld characters." (Denver correspondent)

"A plane equipped with water-cooling had for the first time crossed the equator." (P and W Release)

Mr. E. P. W. of Boston, reports finding, in the University, the following item under the heading of Aviation News: "Agnes' contractor of Lord a Blind Chute used in the first time." (The New York American and Transit release)

While we are on this subject we were worried a bit myself the other day when we noted a marked similarity between the new uniform adopted by an Air line and the Salvation Army uniform. However we have never formed the opinion that things will be all right again soon. We have talked matters over recently with a number of manufacturers and they were all completely listless, which we know to be a good sign. When a manufacturer is happy and gay and really optimistic about the future there can be sure he hasn't an order in his shop.

## THESE GLIDERS WILL BE FLYERS!



WRIGHT Aeronautical wishes good luck to the National Gliding Association. Almost thirty years ago, Orville Wright changed gliding into flying. And today the Wright Company is pleased to assist in the raising of the \$50,000 fund for gliding awards! Each year, in Europe, gliding

clubs bring up new airmen. Each year they help in airplane design and research. Each season they open the eyes of more people to the pleasure of the air. Get behind this fast-growing fledgling of Aviation. It's good business and good sport to help it all we can.

**WRIGHT**  
AERONAUTICAL CORPORATION  
PATERSON, NEW JERSEY  
A DIVISION OF LEXINGTON WRIGHT

*This is one of a series of advertisements devoted originally to advertising men in an effort to make industrial advertising more profitable in design and color. It is placed in these pages as an inducement to readers that McGraw-Hill publishing standards mean advertising effectiveness as well as editorial working.*

## Of course, this doesn't happen every day

Recently in Erie, Pa., a McGraw-Hill circulation man visited a plant to get subscriptions and got the surprise of his life. The story may be interesting to those advertising men, who, in selecting advertising mediums, consider not only reader interest but how circulation is built.

Frankly, this Erie plant was not covered as a unit\* by certain McGraw-Hill publications. The circulation man was there to find out why. In keeping with McGraw-Hill policy he called at the front office, learned the plant set-up and obtained permission to interview key men.

When, finally, he reported back to the front office the surprise came. Unknown to him an executive had watched him work. This executive greeted him somewhat like this:

"SO this is the way McGraw-Hill builds circulation! It interests me because you see we are advertising in your *Engineering News-Record*. We are now going after some mining business and your demonstration here convinces me that your *Coal Age* is a good place for us to advertise."

McGraw-Hill circulation headquarters in New York will gladly explain its principles and practices of circulation building to those who are interested.

## McGraw-Hill PUBLICATIONS

New York Chicago Cleveland Detroit Philadelphia St. Louis  
Greenwich San Francisco Boston London



Curtis Flying Service Hangar, Dayton, Ohio  
Built by Truscon Steel Company, Inc., Youngstown, Ohio  
Truscon products used throughout

### Attractive—Fireproof— Daylighted—Efficient

The specialized requirements of aeronautical buildings are fully met by standardized Truscon Steel Products at economical cost.

In the Curtis Flying Service Hangar, shown above, Truscon Steel Doors are used throughout, including the large Steel Hanging Doors, both Straight Slide and Curved Track Types.

The fireproof roof consists of Truscon Steel-deck, insulated and waterproofed. The floors and roofs are supported on Truscon Steel Joists, "O-E" Open Truss and "P-6" Plate Girder types. The concrete is reinforced with Truscon Welded Steel Fabric and Bars.

Whether interested in individual building products or in complete standardized buildings, write for suggestions, quotations and catalogs.

### TRUSCON STEEL COMPANY

YOUNGSTOWN, OHIO

Branches and Offices in Principal Cities

Truscon Steel Company of Canada, Limited, Montreal, Quebec, Canada

Build NOW While COSTS Are Low

**TRUSCON**  
STEEL BUILDING PRODUCTS  
FOR AIRPLANE HANGARS  
AND AIRPORTS



### Our wide experience

in the field of

### AUTOMOTIVE ENGINES

makes us a  
most practical source  
for

### AIRPLANE SPRINGS

on a production or  
experimental basis

Two Plants for Spring Service

**COOK SPRING CO. DIVISION**  
OF BARNES-GIBSON-RAYMOND BROS.  
ANN ARBOR, MICHIGAN  
DETROIT DIVISION: 1405 MILLIE AVE. DETROIT





MODEL No. 418

Other models from  
60 H.P.—450 H.P.CARBURETOR  
SPECIALISTS  
SINCE 1903

## HOLLEY CARBURETORS

POSITIVE "PICK UP"  
+ EASY STARTING

THE acceleration is taken care of by a pump with special features so that it gives a prolonged action. Further it automatically releases when the throttle is opened and closed too quickly thus preventing "over pumping." Finally the fuel discharges into the center of the air stream.

Descriptive literature, plans for the asking, gives full details of design, construction, control and adjustment.

Write today

## HOLLEY CARBURETOR COMPANY

Detroit, Michigan



Aspirin is made  
in two or three  
minutes' time!

## Airports and Aviation Buildings by Austin

COMPLETE Airport Service—preliminary surveys and reports, engineering surveys and studies, site selection.

Design and Construction—grading, drainage, lighting, all necessary airport buildings such as hangars, depots, etc. Also aircraft factory buildings.

Ask for approximate costs and booklet "Airports and Aviation Buildings."

## THE AUSTIN COMPANY

Airport Engineers and Builders  
Cleveland, Ohio  
Chicago, Ill.  
Detroit, Mich.  
New York, N.Y.  
Philadelphia, Pa.  
Pittsburgh, Pa.  
St. Louis, Mo.  
San Francisco, Cal.  
Seattle, Wash.  
Wichita, Kan.



EVERY airport owner or manager should have a copy of our new booklet, *Types Meteorological Instruments for Airports*. Illustrated throughout and listing instruments which meet government requirements. Write for your copy today.

*Taylor Instrument Companies*

ROCHESTER, N. Y. U. S. A.  
London, England. Paris, France. Berlin, Germany.



## Where the factor of safety is all important . . . .

Through Death Valley, across the Bad Lands, the Rockies, or scorching desert sands, the reliability of Zapon products continues supreme. Since the beginning of aviation they have contributed largely as an all important factor of safety. In

Clean Navas Aeroplane Depots  
Seven Pigeonhead Aeroplane Depots  
Eleven Pigeonhead Aeroplane Depots

the element of safety is constantly assured by the most exacting series of continuous laboratory tests, each step vitally essential to maintaining not only the highest standard of Zapon quality but also absolute safety in the air.

Also Timmers, Lacquer Enamels  
and Lacquer Primers

It is the age of color over the plane and in keeping with the modern design Zapon Check for correct satisfactory finish on ultra lacquered finish in the finest open pore. Resilient in color, resistant to patterns, it is absolutely as such as to "wear and stain and stain"

THE ZAPON COMPANY  
STAMFORD, CONN.

For  
dimensional  
accuracy and  
long life  
specify  
**RAYMOND  
SPRINGS**

The fact that Raymond Valve Springs were used in the Cross Challenger Motor in the Mono-plane "St. Louis Robin" which shattered all existing endurance flight records, is sufficient proof of our ability to meet your spring requirements.

Send us your inquiries for  
coil springs, flat springs,  
wire forms, and small  
stampings.

Makers of  
Quality Springs  
since 1883



RAYMOND MANUFACTURING CO.  
CORRY, PENNSYLVANIA



## STEEL HANGARS

- PERMANENT •
- FIRE-PROOF •
- LOW COST •

The broad and practical experience of this organization gained over a period of years in the construction and erection of steel hangars has been applied with equal success on the building of airplane hangars. Our knowledge and experience in building steel hangars is at your disposal.

**The Thomas & Armstrong Company**  
Airplane Hangar Division  
Dept. C8  
LONDON, OHIO

## Do you know that...

each month our subscription department receives more than 150 requests for "Back" issues of AVIATION?

\*\*\*

If we printed extra copies of our weekly issues, we would be glad to comply with these requests, but unfortunately we have no way of knowing in advance just how many of our newstand readers will "miss" an issue.

\*\*\*

But We Do Know—that each of these requests indicates a reader has "missed" just the item he could make valued use of.

*Insure your receiving  
AVIATION regularly by  
filling in the coupon  
below, today*

### AVIATION

10th Ave. at 36th Street, N. Y. C.

Now is my check for \$5.00. Send me Aviation for 1 year (12 copies).

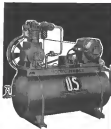
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Subscription Rates: U. S., Canada and Mexico, \$5; Central and South America, \$5; all others, \$6.



## Practical Air Service Units

AN EFFICIENT, dependable air compressor is an absolute necessity in the modern hangar. Two new models developed by U. S. Air Engineers are especially suited to meet aircraft service requirements.

These are U. S. Models MK-86 and MK-86A. Model MK-86, shown above, is a heavy duty, two-stage compressor producing 14 cubic feet of air per minute at high pressure for cleaning engines and operating vacuum shop appliances.

Model MK-86A is a two-cylinder, single-stage compressor with a capacity of 16 cubic feet of air per minute—more than sufficient to operate two paint guns at the same time. Both MK-86 and MK-86A are air-cooled.

The speedy U. S. High Pressure Electric Grease-Gun and other equipment especially used to aviation needs are described in an interesting four-page bulletin which we will gladly send on request.



3348 Harvard Avenue

Cleveland, Ohio

Phone and/or 100 numbers in Airport Equipment.

Name

Address

City

State

# Young Men

## your future depends upon your training

You who receive instruction now will be the ones piloting ships, building, repairing and testing them a few months hence—providing you receive the proper training. The School of Von Hoffmann will give you this training. Von Hoffmann has kept Van Hoffmann's airplane school at the top—a great school with enough purpose—to make each graduate the finest type of pilot or mechanic.



Instruction is given on a variety of line types of Government Licensed modern aircraft types and engine types. Each instructor has been specially trained and licensed by the Department of Commerce as an instructor—which means that he not only has the knowledge but the ability to impart it. Every flight instructor is a transport pilot with two to five thousand hours in the air.

Graduates of the School of Von Hoffmann are in aviation because the courses go beyond the Government requirements, and employers know that they have been thoroughly and practically trained for immediate positions. That is the reason Von Hoffmann graduates are filling responsible positions throughout the industry. Our courses were actual flying, theoretical instruction, and navigation, a complete maintenance and practical shop training in airplane structures and repair of various type planes. A Government rating should be noted on a \$2,000-300 report. No other school in the world can offer you the advantage of Von Hoffmann training. Let us tell you about our liberal cash payment plan. Send today for our new illustrated catalog. Make your start in aviation—start the right way. (NRE)

## Von Hoffmann Aircraft School

Lambert St. Louis Airport—St. Louis, Missouri

U. S. Gov't Approved School for Transport,

Limited Commercial Private Pilot, Ground and Flying

VON HOFFMANN AIRCRAFT SCHOOL  
11111 Lambert St. Louis Airport St. Louis, Mo.—MAIL ORDER

Name

Address

City  State

Age  I am interested in:

☐ Private Course ☐ Transport Course

☐ Pilotage Course ☐ Radio Study



# AIRCRAFT SERVICE DIRECTORY

**See Our Advertisement**  
On inside back cover  
of April 18, 1959  
**PIONEER INSTRUMENT COMPANY**  
124 LEANING HILL BOULEVARD NEW YORK

**HASKELITE**  
FEBRUARY  
Send us your important order. Service  
men in the industry depend on Haskelite  
parts. We have a complete stock of  
parts. Write for our catalog. Haskelite  
100 E. Lincoln Street, Chicago, Illinois

**AIR CRAFT PARTS**  
Machinists needed for the precision  
machining of aircraft parts. We are  
located in the heart of the aviation  
industry. Write for our catalog. Haskelite  
100 E. Lincoln Street, Chicago, Illinois

**Parton Plan for Aircraft**  
Reason, Money, Everything. Parton Plan for  
the aviation industry. Write for our  
catalog. Haskelite 100 E. Lincoln Street,  
Chicago, Illinois

**TRIUMPH**  
SAFETY  
Write for our catalog. Haskelite 100 E. Lincoln Street,  
Chicago, Illinois

**CONSTRUCTION**  
Write for our catalog. Haskelite 100 E. Lincoln Street,  
Chicago, Illinois

**PITCH & BANK**  
INDICATOR  
Write for our catalog. Haskelite 100 E. Lincoln Street,  
Chicago, Illinois

**STEARMAN,**  
**KITTYHAWK and**  
**AEROMARINE KLENN**  
Write for our catalog. Haskelite 100 E. Lincoln Street,  
Chicago, Illinois

**W. L. & S. L.**  
EQUIPMENT, SUPPLIES  
Write for our catalog. Haskelite 100 E. Lincoln Street,  
Chicago, Illinois

**Nitrate Dopes**  
Crystal Clear Nitrate Dopes conform to  
U. S. Navy Specifications and are  
and are immediately guaranteed.  
Write for our catalog. Haskelite 100 E. Lincoln Street,  
Chicago, Illinois

**Quality Aircraft Tubing**  
**TUBING**  
by  
**SUMMERILL**  
Manufacturers  
of Stainless Steel Tubing  
Since 1939  
**Summerill Tubing Co.**  
Beverly Hills, California

**AERIAL PHOTOS**  
A Job for Specialists  
Write for our catalog. Haskelite 100 E. Lincoln Street,  
Chicago, Illinois

**Plastic Clear Nitrate Dopes**  
Write for our catalog. Haskelite 100 E. Lincoln Street,  
Chicago, Illinois

**HANGARS**  
Write for our catalog. Haskelite 100 E. Lincoln Street,  
Chicago, Illinois

**Northeast**  
Write for our catalog. Haskelite 100 E. Lincoln Street,  
Chicago, Illinois

**Airplane Covers**  
Write for our catalog. Haskelite 100 E. Lincoln Street,  
Chicago, Illinois

**Don't Throw Your Plugs Away**  
Write for our catalog. Haskelite 100 E. Lincoln Street,  
Chicago, Illinois

**GOOD ADVICE**  
Should Be Solicited  
When Needed

Every Airplane Plant  
presents a set of highly  
individual problems that  
must be answered by  
expert assistance, taking  
into consideration all of  
the technical peculiarities  
of the plant under  
scrutiny.

You can find the specific  
answer to your aviation  
problem through the  
Directory of Technical  
Service

88  
Page 15

# PROFESSIONAL SERVICES

**DR. MAX M. MUNK**  
Consulting Aeronautical Engineer  
Write for our catalog. Haskelite 100 E. Lincoln Street,  
Chicago, Illinois

**For Advertising Rates on the "Professional Services Directory"**  
Write for our catalog. Haskelite 100 E. Lincoln Street,  
Chicago, Illinois

**Professional Directory Division**  
Write for our catalog. Haskelite 100 E. Lincoln Street,  
Chicago, Illinois

**Youngberg, Brown & Youngberg**  
Airport Engineers  
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Chicago, Illinois

**Complete Airport Construction Service**  
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Chicago, Illinois

**WINDTUNNEL**  
Aerodynamic Research Complex  
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Chicago, Illinois

# SEARCHLIGHT SECTION

**FOR SALE**  
Write for our catalog. Haskelite 100 E. Lincoln Street,  
Chicago, Illinois

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Chicago, Illinois

Save 1/3 on a **SPRAYIT**  
Over  
Electric Outfit!

Only  
**\$1450**  
Regular Price  
**\$1950**

The Same  
Nationally  
Advertised  
VALUE

**NATIONAL JOBING AND EXPORT CO.**  
202 N. Dear St., Dept. A, Chicago, Ill.







*This is one of a series of advertisements directed originally to advertising men in an effort to make industrial advertising more profitable to buyer and seller. It is printed in three parts as an indication is wanted that McGraw-Hill publishing standards mean advertising effectiveness as well as editorial quality.*

## Is your copy keeping step with your salesmen?

**A**N eastern manufacturer selling a product for general industrial use has advertised consistently in six McGraw-Hill publications. His sales year after year have been so satisfactory that he has readily renewed his advertising contracts.

The product is staple—one of those prosaic things that make copy writers age prematurely. A new competitive situation came up last fall that made

the copy obsolete. The advertising writer left his copy desk and turned salesman for a while. He returned with a sharpened pencil and a new viewpoint.

The new copy has been running now for several months. No change in advertising schedule! No change in sales policy! No change in product design or service! Nothing has been changed except the copy, which has become more sales-like and more humanly interesting.

**N**OW comes the president's report on sales for the first quarter. Does it not show that it pays to scrutinize copy as well as the mediums that give it voice?

### THE REPORT\*

I am inclined to believe that the new type of advertising is getting the results we had hoped for. In fact it is coming much better than we had reason to expect. We are very busy in the plant at the present time and our sales for the first quarter are running 25% higher than former years, which is quite a jump. The particular class of work we want done in this advertising has demonstrated our general doubling the machinery in this department and it is now operating on a 24 hour schedule.

\*Excerpt from a personal letter covering internal subject.

## McGraw-Hill PUBLICATIONS

New York Chicago Cleveland Detroit Philadelphia St. Louis  
Grosseville San Francisco Boston London



*Students and planes of the Charles DeLis, Inc., Flying Club at the Buffalo airport. This club is the largest one of the West.*

## "Using Socony exclusively ... ample proof of my appreciation"

"It is particularly gratifying to note the excellent results in all the different types of motors I have used, regardless of weather conditions."

"The fact that I am using both Socony Gasoline and Socony Aircraft Oil, on a basis of ample proof of my appreciation of your products."

So writes Mr. Charles DeLis, of Buffalo, distributor for Waco, Stinson, Ryan, Great

Lakes, and Monocraft aeroplanes. The Charles DeLis Flying Club is the largest east of the Mississippi, operating six ships, two, and ten ships are to be in commission by June 1st.

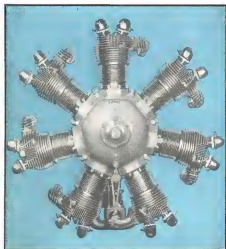
Only gasoline and oils of such a standard as to be completely reliable are suited to aviation purposes. It is the consensus of opinion in airports and throughout aviation circles that Socony products are of this high standard.

# SOCONY

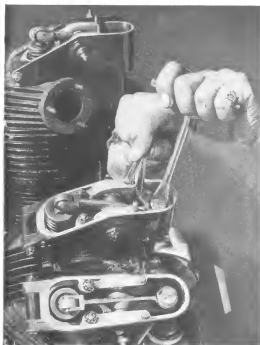
Aviation Gasoline Aircraft Oils

STANDARD OIL COMPANY OF NEW YORK

**P**roper  
**V**alve  
**C**learance  
**A**utomatically  
**M**aintained



# AXELSON ENGINES



## Rocker Boxes

A hinged type of Rocker Box in the Axelson Engine compensates for any change of length of cylinder and automatically maintains valve clearance, regardless of engine temperature. The rocker arm contacting with the valve stem and push rod is of the roller type and is supported by ball bearings. Rocker boxes completely enclose the overhead valve mechanism but the covers may be easily removed, giving free access for valve adjustment and inspection. The valves are of alloy steel, tulip design. Valve guides are shrunk into the cylinder head, both being made of special bronze composition.

Interesting facts about the Axelson Airplane Engine are given in our Catalog. A copy will be forwarded.

## Axelson Aircraft Engine Co.

Factory and General Offices  
 Corner Randolph St. and Boyle Avenue  
 Los Angeles, California  
 (P. O. Box 3371)